

Expt. No. 1 Simulation of Half wave rectifier

Aim : To perform transient analysis of Half wave rectifier on FreeEDA

Components required with references :

1. Sine wave source (Sine)
2. Resistor (R) of 500Ω
3. SCR (scr)
4. Voltmeters (vplot1 and vplot)
5. Ground (gnd)

Procedure:

1. Create the schematic of the half wave rectifier as shown in Fig. 1.1.
2. Change the reference of the SCR from U to X.
3. Annotate the schematic.
4. Test Electric rules.
5. Generate the netlist.
6. Insert analysis for transient analysis from 0 to 40 ms with a step time of $40\ \mu\text{s}$.
7. Import the subcircuit of SCR.
8. Edit model for diode (set $bv=1800$ and $I_s=2.2E-15$).
9. Convert KiCad netlist to Ngspice netlist.
10. Simulate the Ngspice netlist using Ngspice simulator.

Conclusion : Transient analysis of half wave rectifier is performed and results are verified.

FreeEDA schematic of Half wave rectifier :

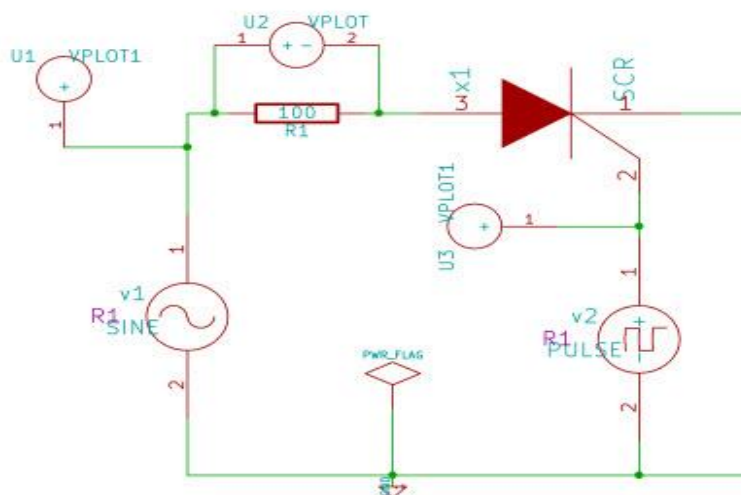


Fig. 1.1 FreeEDA schematic of half wave rectifier.

Parameters of Input :

Parameters of sine wave :

Offset	: 0
Amplitude	: 100
Frequency	: 50
Delay	: 0
Damping Factor	: 0

Parameters of pulse :

Initial value	: 0
Pulsed value	: 5
Delay	: 4m
Rise time	: 0
Fall time	: 0
Pulse width	: 2m
Pulse period	: 20m

Simulation Results :

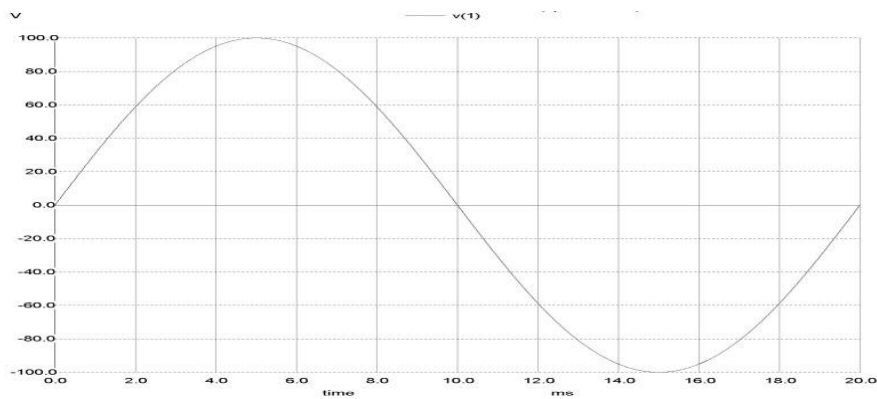


Fig. 1.2 Input waveform

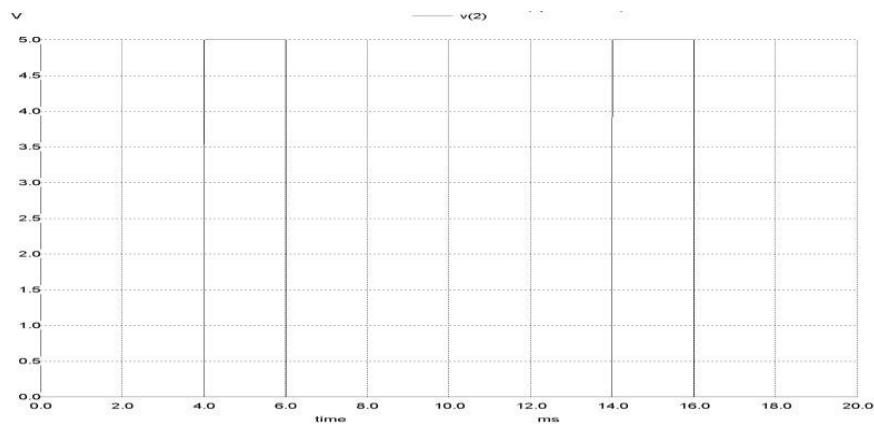


Fig. 1.3 Pulse waveform for trigger

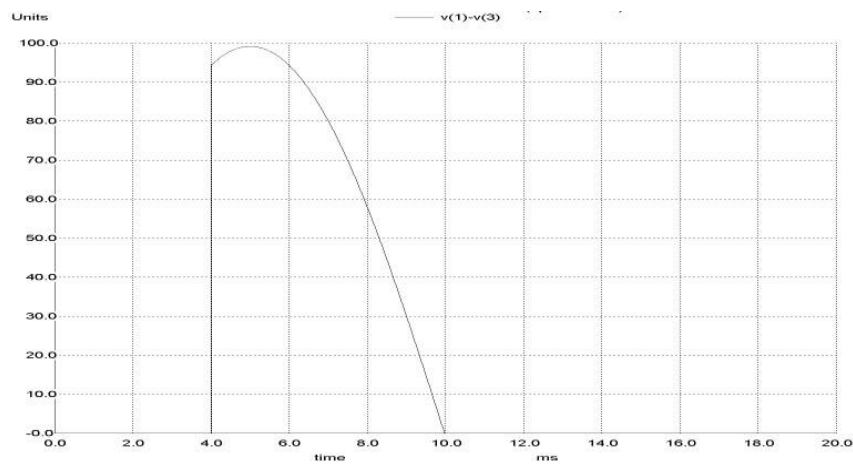


Fig. 1.4 Half wave rectified output waveform